Hence there is reason to think that, contrary to the general opinion, white garments are warmer than any other in cold weather; and indeed if they are well calculated to reflect calorific rays in summer, they ought to be equally well calculated to reflect those frigorific rays by which we are annoyed in winter. Fur garments have been found by experience to be much warmer in cold weather, when worn with the hair outwards, than when it is turned inwards.

This is alleged as a proof that we are kept warm by our clothing not so much by confining the heat of our bodies, as by repelling those frigorific rays which tend to cool us. The fur of several delicate animals we know becomes white in winter in cold countries; and bears which inhabit the polar regions are likewise known to be white in all seasons. Now if, in fact, as there is great reason to believe, white is the colour most favourable to the reflection of calorific and frigorific rays, it must be acknowledged that these animals have been greatly favoured in having a clothing assigned them so well adapted to their local circumstances.

The excessive cold which is known to prevail, in all seasons, on the tops of high mountains, and the frosts at night which frequently take place on the surface of the plains below, seem to indicate that frigorific rays arrive continually at the surface of the earth from every part of the heavens; and it is no doubt by the action of these rays that our planet is continually cooled, and enabled to preserve the same mean temperature for ages, notwithstanding the immense quantities of heat that are generated at its surface by the continual action of the solar rays. The action of these frigorific nocturnal rays will likewise justify the inhabitants of hot climates, who, in order to be more cool during their hours of rest, remove their beds in summer to the tops of their houses.

Experiments and Observations on the Motion of the Sap in Trees. In a Letter from Thomas Andrew Knight, *Esq. to the Right Hon. Sir* Joseph Banks, *Bart. K.B. P.R.S.* Read February 16, 1804. [*Phil. Trans.* 1804, *p.* 183.]

Some experiments are here described, the tendency of which is to prove, what the author had advanced as a conjecture in a former communication, that the vessels of the bark which pass from the leaves to the roots, are in their organization better calculated to carry the fluids they contain towards the roots than in the opposite direction.

In the first of these experiments several strong horizontal shoots of vines were depressed about their middle; and at that part, buried in the mould, contained in pots about ten inches in diameter: after some months of vegetation, when the shoots had nearly filled the pots with roots, they were separated from the parent stock, having at each side above the earth a certain length of the layer, with at least one bud upon each. The end towards the stock was called the inverted, and the other the proper end of the layer. If the author's

above-mentioned conjecture of the retrograde motion of the sap be founded, it would follow that in the subsequent vegetation the inverted would display a more vigorous growth than the proper end; and this accordingly was soon found to be the case, with this additional circumstance, that the parts beyond the buds on the inverted ends were observed to increase considerably, while the same parts on the proper ends not only withered, but even gradually died away.

In another experiment a number of cuttings of gooseberry and currant trees were planted, some in their natural erect, and others in an inverted position. Many of these, especially the gooseberry cuttings, failed altogether; but in those that survived, the same accumulation of wood was observed on the upper ends of the inverted cuttings as on the vine shoots: similar effects were likewise observed in inverted grafts of the apple-tree, and in some respects also in cuttings from the sallow-tree, where, however, they being of some length, the accumulation of wood did not take place at the summit, but about the base of the cuttings.

It will be needless to dwell minutely on these results, since they may all be deduced from the author's theory, which, in addition to what has been above stated, is, nearly in his own words,—that the vessels of plants are not equally well calculated to carry their contents in opposite directions; and that the vessels of the bark, like those which constitute the venous system of animals (to which they are in many respects analogous), are provided with valves, imperceptible indeed to our eye on account of their extreme minuteness, but whose effects in directing the course of the sap are sufficiently obvious.

The paper concludes with some strictures on the experiments described by Hale and Du Hamel, and the reasons why these naturalists did not arrive at the same conclusions which are here brought forward, and an experiment which illustrates some parts of the paper the author gave last year on the descent of sap in trees.

Analytical Experiments and Observations on Lac. By Charles Hatchett, *Esq. F.R.S.* Read April 12, 1804. [*Phil. Trans.* 1804, *p.* 191.]

A brief historical account of the substance here treated of is prefixed to this paper. Though long in use, especially in India, yet, except what we have lately learnt from Mr. Kerr and Mr. Saunders, few inquiries have hitherto been made concerning its mode of production, first discovery, its nature and relative properties. We now know that it is the nidus or comb of the insect called Coccus, or Chermes Lacca, deposited on branches of certain species of Mimosa and other plants; and that the kingdom of Assam furnishes it in the greatest quantity. There are four sorts of it:—1. The stick lac, being the substance or comb in its natural state, incrusting small branches or twigs. 2. Seed lac, or the same substance granulated, but probably prepared in some manner, it being deprived of a great part of its colouring matter. 3. Lump lac, formed from seed lac,